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A SEWAGE SYSTEM CONSUMING VERY LITTLE WATER

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No. 595 A SEWAGE SYSTEM CONSUMING VERY LITTLE WATER

A.3.4.1.

by

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The population of cities and towns is growing at an accelerating rate. At the same time there is an increasing demand for better sanitation. An adequate supply of pure water is essential for good sanitation, lowered infant mortality and greater longevity. A pure water supply, however, is dependent upon more than availability or otherwise of good water sources: it also involves the purification of sewage water. The more people who live in an area, the more the sewage and the greater the need for strict protection of water sources.

The conventional sewerage system is based on water as a conveyance for waste. The foul water flows in pipes which slope from the collection area to the treatment plant. Liquid sewage from domestic districts consists of waste water (from bath, kitchen sink and home laundry) and of W.C. soil. Sewage from the W.C.'s is composed of small quantities of solids mixed with large quantities of water, necessary to keep the solids moving. Domestic waste water and W.C. soil are discharged in the same conduits. This means that waste water, which is safe under normal conditions, is mixed with objectionable matter from the W.C.'s; the latter is responsible for about 80% of all the organic impurities found in the mixed sewage water and virtually all the pathogenic bacteria.

The Swedish Engineer Joel Liljendahl has invented an improved sewerage for water closets. In this new system the excrements and urine are transported through plastic tubes connected to a vacuum tank. After use, each closet bowl is automatically cleansed through flushing with about .2 gallons of pressurized water. This very small amount of water forms together with the waste a homogeneous slurry and, under the influence of the air pressure difference, this is conveyed in the shape of spaced plugs to said vacuum tank. The waste may then directly or after a decay process be utilized as a fertilizer or other soil improver (Figure I).

The new type of W.C.-stool is simple and reliable in running (Fig. II). Contrary to the conventional W.C.-stool no mobile parts are under water in the vacuum stool.

In the Liljendahl system the total daily water consumption pro person amounts to 1 to 2 gallons as compared with 10 to 20 gallons in conventional systems.

The degree of vacuum in the tank necessary for the transport can be conventionally attained by the use of comparatively small vacuum pumps driven by electric motors or by internal combustion engines. The operation costs of these pumps are also very low. For example, three 3-h.p. pumps will suffice for a community of 4,000 inhabitants.

The discharge plastic pipes in the Liljendahl system may have a diameter of only 40 to 50 millimetres instead of 100 to 150 millimetres in the conventional systems. The plastic pipes are simpler to make and save an enormous amount of material. For instance, a 330-foot main with 40 branches weighs only about 110 lb. in the Liljendahl system, as compared with 3,300 lb in the conventional system with cast iron pipes. To a certain extent the pipes may be disposed horizontally or in an uphill direction. From the point of view of building construction the Liljendahl system involves considerable advantages. Plastic pipes, being flexible, can be easily guided past obstacles that would have meant cutting, jointing or the use of bends in cast iron or concrete pipes. Furthermore, the plastic pipes take a minimum of space and are always easy to fit in frame construction. They withstand blows, subsidence, earth tremors, rock-blasting, etc. and enjoy a longer life than conventional piping, especially as they do not rust, which means fewer repairs.

The Liljendahl system simplifies modular construction and prefabricated methods of building. Where drainage is to be installed in older buildings, the Liljendahl system costs far less than the conventional system, because fewer structural alterations are required.

Because of the vacuum, a leak in a pipe will cause air to be sucked in, instead of effluent leaking out. This eliminates the risks of pollution and objectionable odours.

Plastic pipes reduce noise disturbance inside the building, since they do not transmit as much sound to the frame as cast iron piping.

The waste from water closets produces practically the total quantity of pathogene bacteria normally existing in waste water in conventional sewerages. In the Liljendahl system there are provided separate discharge pipes for the water closet waste and the pipes for other waste water originating from bath tubs, lavatories, washing basins etcetera. This latter waste may be used without any inconvenience for agricultural irrigation or for infiltration purposes.

The Liljendahl system concentrates the pollution. Because so little sewage water has to be purified, when purification is necessary, the treatment plant can be built for less than the cost of a conventional plant. Furthermore the plant can be designed to permit almost complete purification as well as retention of the nutrient salts. High-grade fertilizers can be made by these salts by drying and pulverization: in this form they are practically odourless and hence saleable.

Certain test plants of different types have been carried out to obtain practical experience of the Liljendahl system before exploiting the system on a large scale. As an example, the new system has been applied in a cottage district since 1959 and has since then been operating continuously in a very satisfactory way. Now the new system is being installed in buildings of different types.

Many countries have expressed the wish to be allowed to use the Liljendahl system, and it will most certainly be used all over the world, when modern and hygienic residential areas are to be constructed.

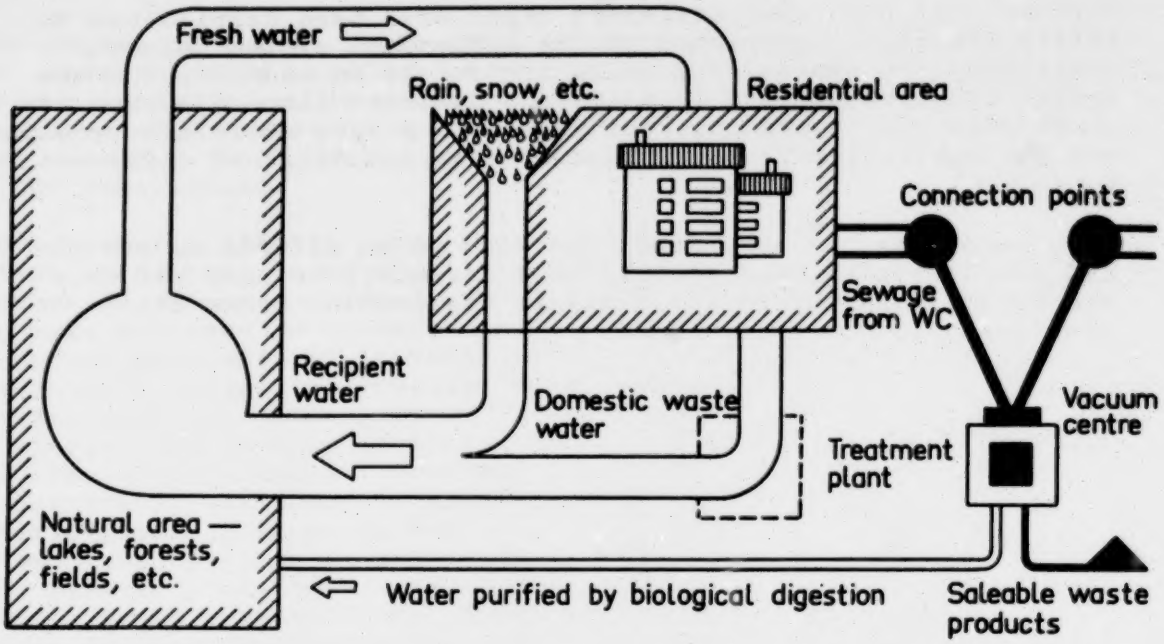

Figure I : Skeleton drawing showing the Liljendahl sewerage system for a residential area

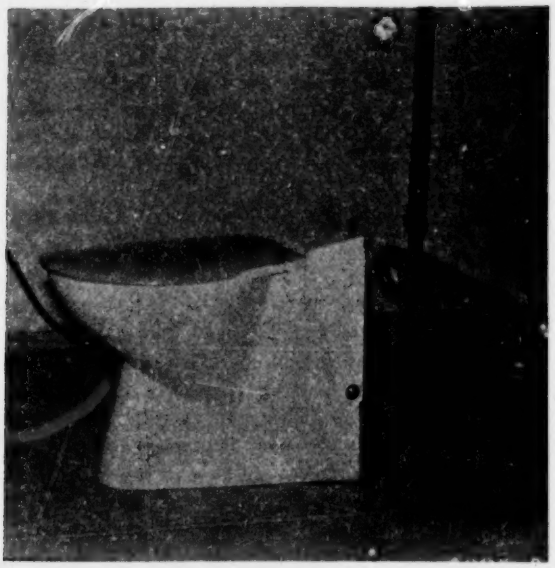

Figure II: The new type of WC-stool, from which the sewage - due to the existence of a vacuum - is carried by air

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